



U.S. Department
of Transportation

**Federal Highway
Administration**

SYNTHESIS OF PUBLIC-
PRIVATE PARTNERSHIP
PROJECTS FOR ROADS,
BRIDGES & TUNNELS
FROM AROUND THE
WORLD – 1985-2004



Prepared By

AECOM CONSULT

T E A M

AUGUST 30, 2005

August 30, 2005

Mr. James March
Manager
Federal Highway Administration – Office of Policy
HPTS, Room 3324
400 Seventh Street, SW
Washington, DC 20590

**SYNTHESIS OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS FOR ROADS,
BRIDGES & TUNNELS FROM AROUND THE WORLD – 1985-2004**

Dear Mr. March:

AECOM Consult, Inc. is pleased to present the results of our synthesis of a comprehensive database of highway infrastructure projects from around the world financed or delivered through some form of public-private partnership.

The data used for this study comes from the *2004 International Public Works Financing Projects* database, published by Public Works Financing. The publication lists almost 2,100 public use infrastructure projects from around the world that have been proposed or developed over the past 20 years using private financing or delivery as part of a public-private partnership. These include projects for roads, bridges, and tunnels (the focus of this report), plus railroads, airports, seaports, water/wastewater facilities, and buildings.

This report characterizes the principal types of PPP projects and their contracting approaches used by different regions and countries around the world. The results provide a valuable reference tool for those interested in developing PPP arrangements for proposed highway, bridge, or tunnel projects in the United States by demonstrating what other nations have and are doing. Overseas trends in the use of different contracting approaches for delivering major highway infrastructure projects through public-private partnerships may portend possible directions for highway-related projects to take in the future, as the PPP market matures in the United States.

Thank you for your comments and suggestions for improving the draft version of this report. We appreciate the opportunity to once again serve the FHWA's Office of Policy.

Very truly yours,



Daniel L. Dornan, P.E.
Senior Consulting Manager
AECOM Consult, Inc.

Table of Contents

<u>Section</u>	<u>Page</u>
1. Introduction	1
• Public-Private Partnerships (PPPs)	1
• Basis for Synthesis	2
2. Global PPP Financing or Delivery of Public-Use Infrastructure by Facility Type	4
3. Regional PPP Financing or Delivery of Public-Use Infrastructure by Facility Type	7
4. United States PPP Financing or Delivery of Public-Use Infrastructure by Facility Type	9
5. Global PPP Financing or Delivery of Road Projects by Region	11
6. Global PPP Financing or Delivery of Road Projects by Contract Type	15
7. Regional PPP Financing or Delivery of Road Projects by Contract Type	19
8. Regional/National PPP Financing or Delivery of Road Projects by Project Type	20
• Non-Toll Highways	21
• Toll Highways	23
• Toll Bridges	25
• Toll Tunnels	27
• Toll Bridges & Tunnels	29
9. United States PPP Financing or Delivery of Road Projects by Project Type	31
10. Conclusions	35

List of Exhibits

<u>Exhibit</u>	<u>Page</u>
1. Worldwide Infrastructure Projects Planned or Completed since 1985 by Project Type	4
2. Worldwide Infrastructure Projects Planned & Funded since 1985 by Project Type	5
3. Worldwide Infrastructure Projects Funded & Completed by October 2004 by Project Type	6
4. Regional Infrastructure Projects Planned or Completed since 1985 by Project Type	8
5. United States Infrastructure Projects Planned or Completed since 1985 by Project Type	9
6. Distribution of United States Infrastructure Projects Planned or Completed since 1985 by Project Type	10
7. Worldwide Road Projects Planned or Completed since 1985 by Region	11
8. Worldwide Road Projects Planned & Funded since 1985 by Region	13
9. Worldwide Road Projects Funded & Completed by October 2004 by Region	14
10. Alternative Contractual Arrangements for Delivering Highway Infrastructure	16
11. Worldwide Road Projects Planned or Completed since 1985 by Contract Type	17
12. Distribution of Worldwide Road Projects Planned or Completed since 1985 by Contract Type	18
13. Regional Road Projects Planned or Completed since 1985 by Contract Type	20
14. Non-Toll Highway Projects Planned or Completed since 1985 by Region and Contract Type	22
15. Toll Highway Projects Planned or Completed since 1985 by Region and Contract Type	24
16. Toll Bridge Projects Planned or Completed since 1985 by Region and Contract Type	26
17. Toll Tunnel Projects Planned or Completed since 1985 by Region and Contract Type	28
18. Toll Bridge & Tunnel Projects Planned or Completed since 1985 by Region and Contract Type	30
19. United States Road Projects Planned or Completed since 1985 by Project Type and Contract Type	
20. United States Road Projects Planned or Completed since 1985 by Project Type	33
21. United States Road Projects Planned or Completed since 1985 by Contract Type	34

SYNTHESIS OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS FOR ROADS, BRIDGES & TUNNELS FROM AROUND THE WORLD – 1985-2004

1. Introduction

This report presents a synthesis of a comprehensive database¹ of highway infrastructure projects from around the world financed or delivered through some form of public-private partnership (PPP). This synthesis provides insights into the nature and extent of highway infrastructure projects that have and are being advanced through various types of PPP contractual arrangements. They also reveal the predominant types and sizes of PPP contracts used in various regions and countries around the world for developing different types of highway infrastructure, including roads, bridges, and tunnels. The results of this synthesis are intended to inform those involved in the development, funding, or delivery of highway infrastructure regarding the worldwide use of PPPs to delivery highway and other forms of public use infrastructure.

Public-Private Partnerships (PPPs)

A public-private partnership is defined as:

“... a contractual agreement formed between public and private sector partners, which allows more private sector participation than is traditional. The agreements usually involve a government agency contracting with a private company to renovate, construct, operate, maintain, and/or manage a facility or system. While the public sector usually retains ownership in the facility or system, the private party will be given additional decision rights in determining how the project or task will be completed.”²

PPP projects can involve a wide range of responsibilities and risks for the public and private sector partners. The nature and extent of private sector involvement in PPP projects can range from *Management-Support Contracts* to outright *Asset Sales*, with the private sector taking increasing responsibility for various functions comprising the infrastructure asset life-cycle: *Manage – Design – Build – Operate – Maintain – Finance – Own*. What distinguishes PPPs from traditional contract approaches to infrastructure development (such as *Design-Bid-Build (DBB)* project delivery and *Pay-As-You-Go* public sector financing) is the greater responsibility and risk taken by the private sector partners in return for an adequate return on their investment in the project or coverage of their costs. Several types of PPP projects involve the use of private financing. Others involve the private sector partners assuming greater responsibilities and risks for project/service delivery.

¹ *2004 International Public Works Financing Projects – Volume 187*. Public Works Financing. Westfield, NJ. October 2004.

² *Report to Congress on Public-Private Partnerships*. United States Department of Transportation, Federal Highway Administration, Washington, D.C. December 2004.

Basis for Synthesis

This report is based on information developed and maintained by the editor of *Public Works Financing (PWF)*, a periodical which provides information and views regarding financing issues, trends, methods, and projects involving public-use infrastructure. The data used for this study comes from the 2004 version of the *International Public Works Financing Projects* database. This database includes almost 2,100 public use infrastructure projects from around the world that have been proposed and/or developed over the past 20 years using private financing or project delivery through a public-private partnership. These include projects for roads, bridges, and tunnels (the focus of this report), plus railroads, airports, seaports, water/wastewater facilities, and buildings.

The database includes completed and proposed projects, some of which may be changed significantly, dropped entirely, or replaced. In developing the regional and national summaries by project and contract type, projects were omitted that lacked sufficient information to permit the calculation of average project cost or define the contract type. No effort was made to independently verify the information contained in the PWF database. Therefore, the information contained in this report should be considered as approximate and not a definitive or exact indication of PPP activity by country, project type, or contract type.

Among the surface transportation categories noted in the database, the following are most relevant to the highway arena:

- Non-toll motorway (highway)
- Toll motorway (highway)
- Toll bridge
- Toll tunnel
- Toll bridge and tunnel

In addition to project type, the database provides a variety of information on each project, including the following attributes, as available:

- Overall project description and timing
- Contract type
- Region and country
- Project status
- Public sponsor
- Private developer/partner
- Project cost
- Financier

The nature of the public-private partnership for each project is defined by the type of contract used to bind the private and public partners to the project. The following lists different types of PPP contracts included in the PWF database. Each represents varying levels of private sector responsibility for functions comprising the infrastructure asset life cycle:

- Management contract
- Design-build
- Design-build-operate-maintain
- Design-build-finance-operate
- Build-operate-transfer
- Build-transfer-operate
- Build-own-operate
- Joint development agreement
- Concession
- Asset sale

This report contains cross-tabulations of different kinds of road, bridge, and tunnel projects by contract type, project size, and region (with most active countries noted). This synthesis provides an informative profile of the common characteristics and contrasts in the types of PPP projects and their contracting approaches between regions and countries around the world. The results provide a valuable reference tool for those interested in developing PPP arrangements for proposed highway, bridge, or tunnel projects in the United States by demonstrating what other nations have and are doing. Overseas trends in the use of different contracting approaches for delivering major highway infrastructure projects through public-private partnerships may portend possible directions for transportation infrastructure PPPs to take in the future, as the PPP market matures in the United States.

2. Global PPP Financing or Delivery of Public-Use Infrastructure by Facility Type

The use of private financing for infrastructure projects is widespread around the world. According to the PWF database, almost 2,100 projects of all kinds have been planned and/or financed since 1985, as indicated in Exhibit 1 below. This includes \$887 billion in projects planned since 1985, of which about half or \$451 billion were completed by October 2004.

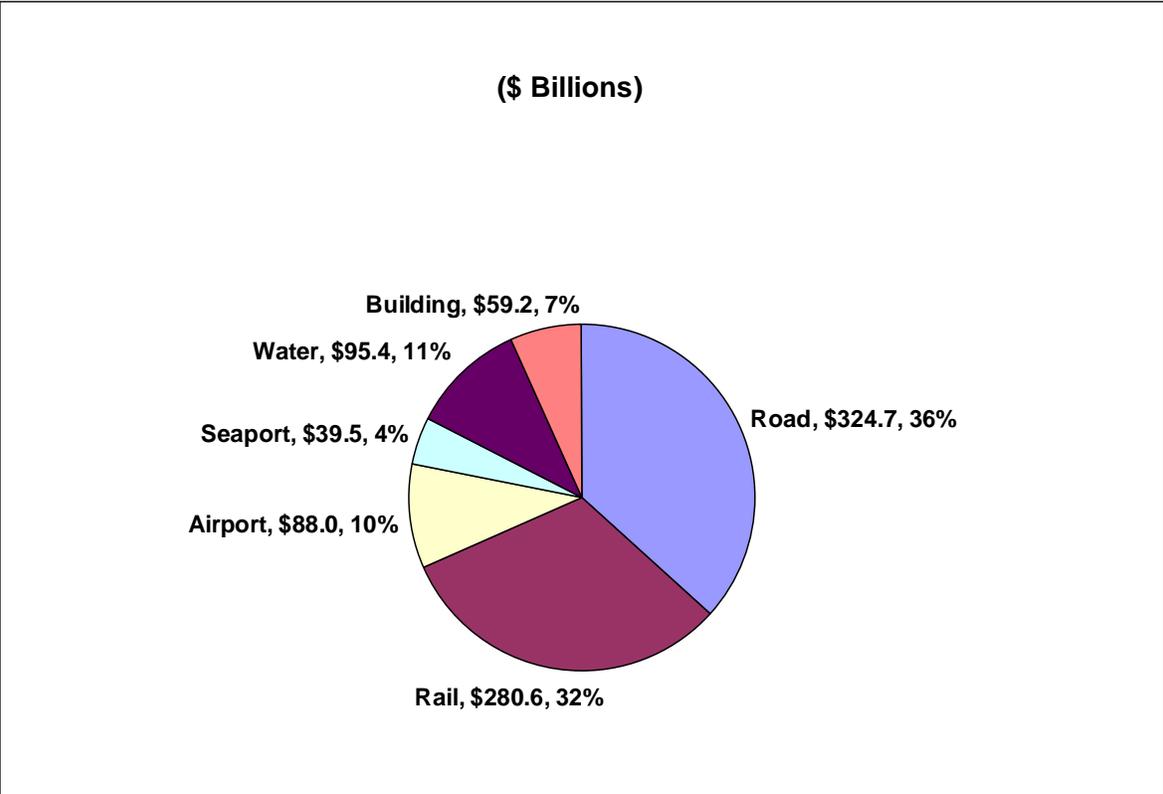
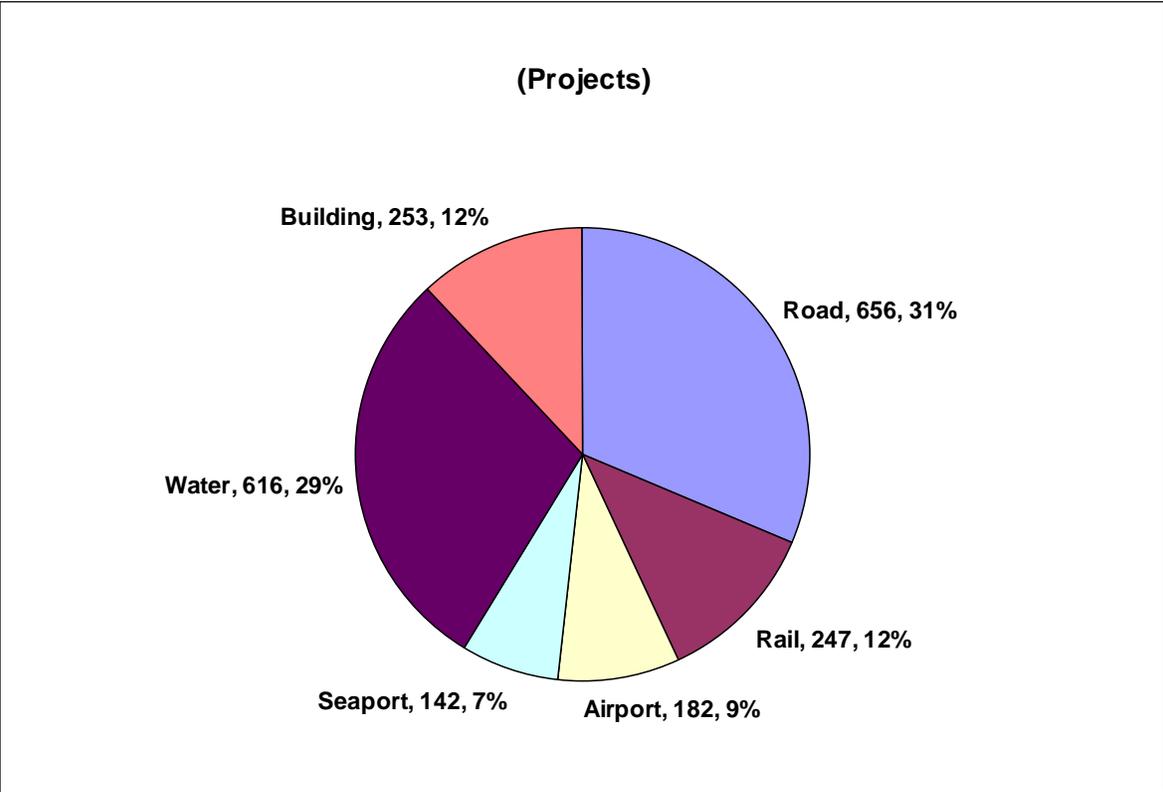
Exhibit 1 – Worldwide Infrastructure Projects Planned or Completed since 1985 by Project Type*

Project Type	Total Planned & Funded Since 1985				Total Funded & Completed by 10/04				% Funded & Completed by 10/04	
	#	%	\$Billion	%	#	%	\$Billion	%	% of #	% of \$
Road	656	31%	\$324.7	37%	359	32%	\$157.3	35%	55%	48%
Rail	247	12%	\$280.6	32%	107	10%	\$143.7	32%	43%	51%
Airport	182	9%	\$88.0	10%	67	6%	\$49.5	11%	37%	56%
Seaport	142	7%	\$39.5	4%	44	4%	\$10.6	2%	31%	27%
Water	616	29%	\$95.4	11%	391	35%	\$62.8	14%	63%	66%
Building	253	12%	\$59.2	7%	153	14%	\$27.0	6%	60%	46%
Total	2096	100%	\$887.4	100%	1121	100%	\$450.9	100%	53%	51%

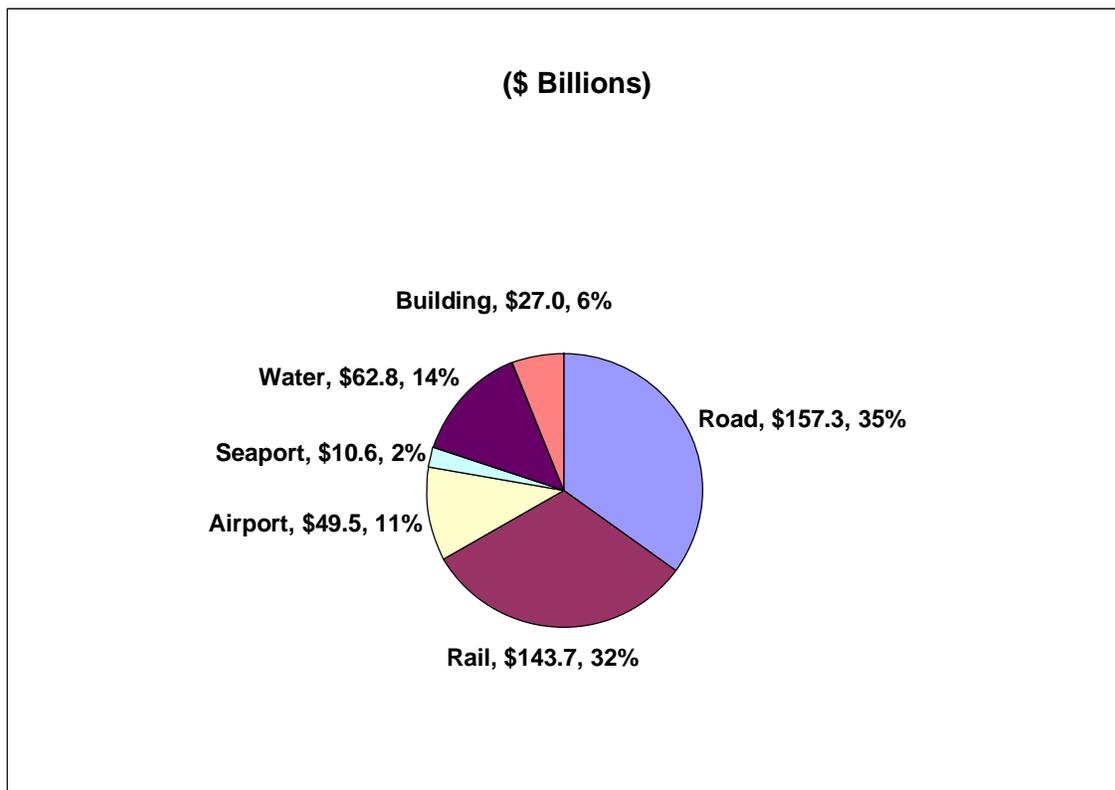
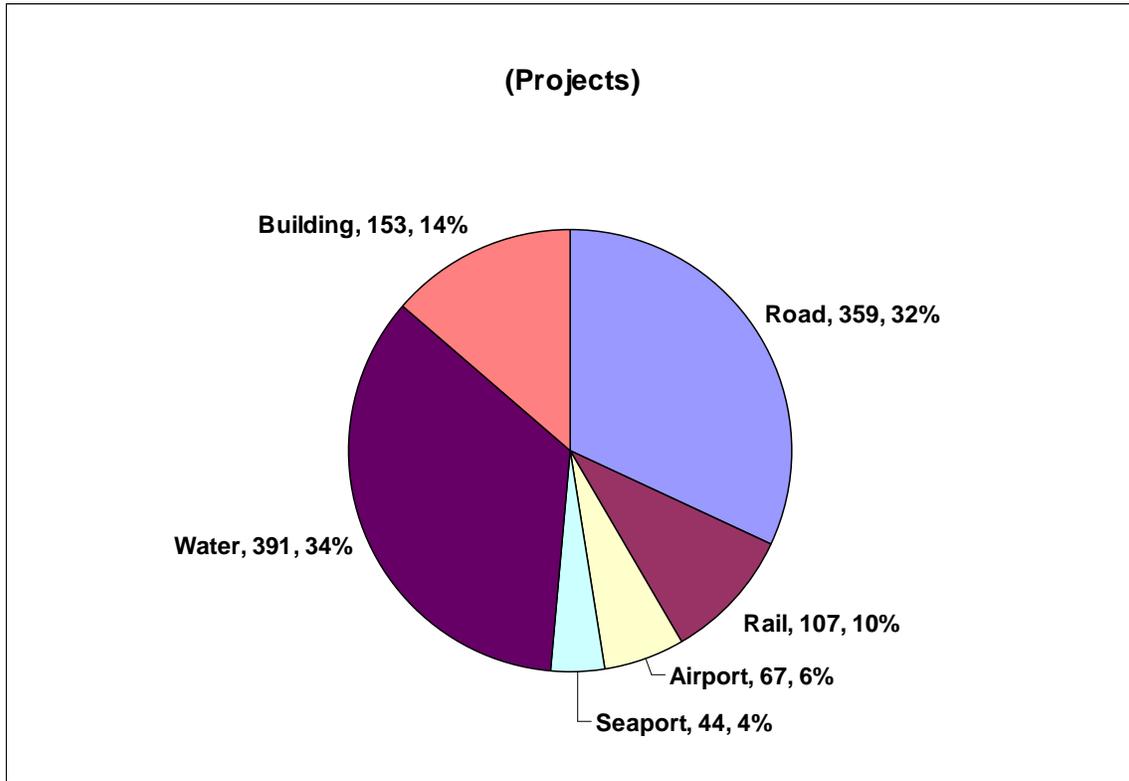
* Based on total PWF database, including projects with partial information

As shown in Exhibits 2 and 3 on the next two pages, about a third of the public-use infrastructure planned since 1985 or completed by October 2004 have been for road projects, including highways, bridges, and tunnels. On a worldwide basis, *road* has been the largest category of infrastructure using private financing through a public-private partnership arrangement.

Exhibit 2 - Worldwide Infrastructure Projects Planned and Funded since 1985 by Project Type



**Exhibit 3 – Worldwide Infrastructure Projects Funded & Completed
by October 2004 by Project Type**



3. Regional PPP Financing or Delivery of Public-Use Infrastructure by Facility Type

The predominant types of infrastructure financed or delivered through some form of PPP arrangement varies by region based on the level of development and relative modal share of travel in each region. According to Exhibit 4, the largest proportion of funding is generally for *roads*, with *rail* the second greatest use of PPP-based financing or project delivery. This is true for each region, except for Africa and the Middle East, where *water* projects dominate. Countries in this region are generally less developed economically and in greater need of basic water delivery and treatment resources. However, even in Africa and the Middle East, *road* projects are the second largest proportion of PPP-financed or delivered infrastructure projects.

As shown in Exhibit 4, the use of PPP arrangements for infrastructure project financing or delivery of highway-related projects is widespread among the regions of the world. These initiatives support continued economic growth in the more developed parts of the world or foster economic development in the less developed parts of the world. In the latter case, various international funding organizations like the World Bank, the Asian Development Bank, or the Inter-American Development Bank, stimulate the use of various financial and asset management tools and techniques to promote the development of needed infrastructure projects around the world, particularly road and rail projects.

According to Exhibit 4, Europe has the largest PPP infrastructure program in terms of *road* and *rail* project costs. Asia has the second largest *road* and *rail* programs, although in recent years Asian countries have added significantly to their highway PPP projects. North America is third among the five regions considered, in terms of the cost of *road* and *rail* projects financed or delivered through some form of PPP arrangement. This may change as more project sponsors seek to leverage and expedite their capital improvement programs through the use of PPPs, innovative financing, and innovative project delivery.

Exhibit 4 –Regional Infrastructure Projects Planned or Completed Since 1985 by Project Type*

Region	Project Type	Total Planned & Funded Since 1985				Total Funded & Completed by 10/04				% Funded & Completed by 10/04	
		#	%	\$Billion	%	#	%	\$Billion	%	% of #	% of \$
Africa & Middle East	Road	14	13%	\$4.8	18%	7	19%	\$3.7	45%	50%	76%
	Rail	16	15%	\$5.6	21%	1	3%	\$0.2	2%	6%	3%
	Airport	9	8%	\$1.8	6%	1	3%	\$0.2	2%	11%	9%
	Seaport	11	10%	\$4.9	18%	3	8%	\$0.2	3%	27%	5%
	Water	55	51%	\$10.0	37%	23	62%	\$3.8	47%	42%	38%
	Building	3	3%	\$0.2	1%	2	5%	\$0.0	1%	67%	18%
	Subtotal	108	100%	\$27.3	100%	37	100%	\$8.1	100%	34%	30%
Asia & Far East	Road	137	28%	\$83.9	27%	72	30%	\$44.5	27%	53%	53%
	Rail	85	17%	\$99.1	32%	29	12%	\$48.0	29%	34%	48%
	Airport	61	12%	\$57.6	19%	25	10%	\$38.0	23%	41%	66%
	Seaport	55	11%	\$24.9	8%	14	6%	\$8.3	5%	25%	33%
	Water	137	28%	\$36.4	12%	91	38%	\$25.4	15%	66%	70%
	Building	23	5%	\$9.3	3%	9	4%	\$1.3	1%	39%	14%
	Subtotal	498	100%	\$311.2	100%	240	100%	\$165.5	100%	48%	53%
Europe	Road	205	36%	\$139.1	43%	91	29%	\$58.1	34%	44%	42%
	Rail	62	11%	\$112.9	35%	39	12%	\$74.9	44%	63%	66%
	Airport	44	8%	\$14.4	4%	15	5%	\$5.1	3%	34%	35%
	Seaport	23	4%	\$2.5	1%	14	4%	\$0.9	1%	61%	35%
	Water	125	22%	\$19.1	6%	93	30%	\$12.9	8%	74%	67%
	Building	107	19%	\$35.3	11%	62	20%	\$18.6	11%	58%	53%
	Subtotal	566	100%	\$323.3	100%	314	100%	\$170.4	100%	55%	53%
Latin America & Caribbean	Road	126	36%	\$26.2	37%	83	47%	\$18.9	53%	66%	72%
	Rail	46	13%	\$19.9	28%	22	13%	\$7.2	20%	48%	36%
	Airport	33	9%	\$6.5	9%	7	4%	\$0.8	2%	21%	12%
	Seaport	48	14%	\$5.9	8%	12	7%	\$0.9	2%	25%	15%
	Water	87	25%	\$12.0	17%	45	26%	\$7.9	22%	52%	66%
	Building	11	3%	\$0.7	1%	6	3%	\$0.3	1%	55%	38%
	Subtotal	351	100%	\$71.1	100%	175	100%	\$35.9	100%	50%	50%
North America	Road	174	30%	\$70.8	46%	106	30%	\$32.2	45%	61%	46%
	Rail	38	7%	\$43.1	28%	16	5%	\$13.5	19%	42%	31%
	Airport	35	6%	\$7.7	5%	19	5%	\$5.5	8%	54%	71%
	Seaport	5	1%	\$1.4	1%	1	0%	\$0.3	0%	20%	23%
	Water	212	37%	\$17.9	12%	139	39%	\$12.8	18%	66%	72%
	Building	109	19%	\$13.7	9%	74	21%	\$6.8	10%	68%	50%
	Subtotal	573	100%	\$154.4	100%	355	100%	\$71.1	100%	62%	46%
Worldwide	Road	656	31%	\$324.7	37%	359	32%	\$157.3	35%	55%	48%
	Rail	247	12%	\$280.6	32%	107	10%	\$143.7	32%	43%	51%
	Airport	182	9%	\$88.0	10%	67	6%	\$49.5	11%	37%	56%
	Seaport	142	7%	\$39.5	4%	44	4%	\$10.6	2%	31%	27%
	Water	616	29%	\$95.4	11%	391	35%	\$62.8	14%	63%	66%
	Building	253	12%	\$59.2	7%	153	14%	\$27.0	6%	60%	46%
	Total	2096	100%	\$887.4	100%	1121	100%	\$450.9	100%	53%	51%

* Based on total PWF database, including projects with partial information

4. United States PPP Financing or Delivery of Public-Use Infrastructure by Facility Type

The total cost of PPP infrastructure projects in the United States planned or funded since 1985 has amounted to \$104 billion, of which 40 percent has been for road projects, including highways, bridges, and tunnels (as shown in Figure 5). As with the worldwide statistics, *road* represents the largest category of PPP infrastructure projects in terms of costs. The second largest category of infrastructure project in terms of costs is *rail*, at 33 percent. *Rail* projects in the U.S. include light rail, commuter rail, mono-rail, high speed rail, and freight rail projects.

Water represents the largest category for the U.S. in terms of number of projects. However, water projects in the U.S. tend to be much less costly (average \$82 million) than road projects (average \$577 million).

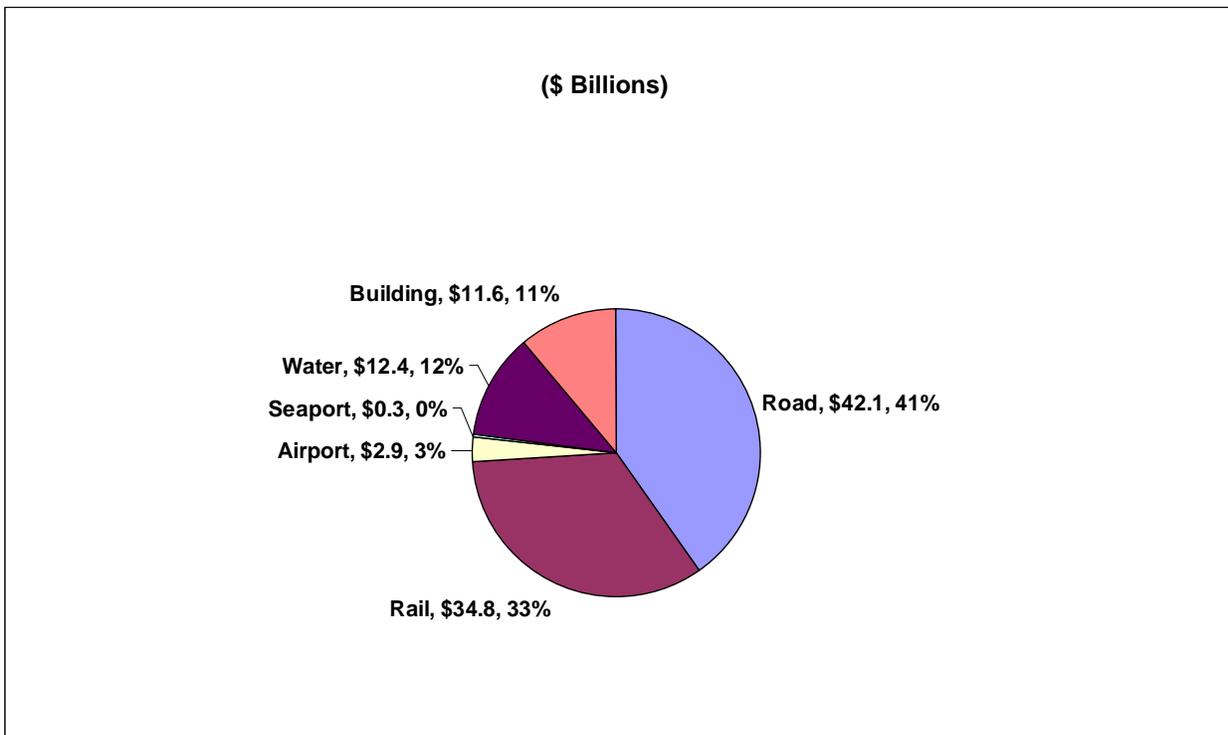
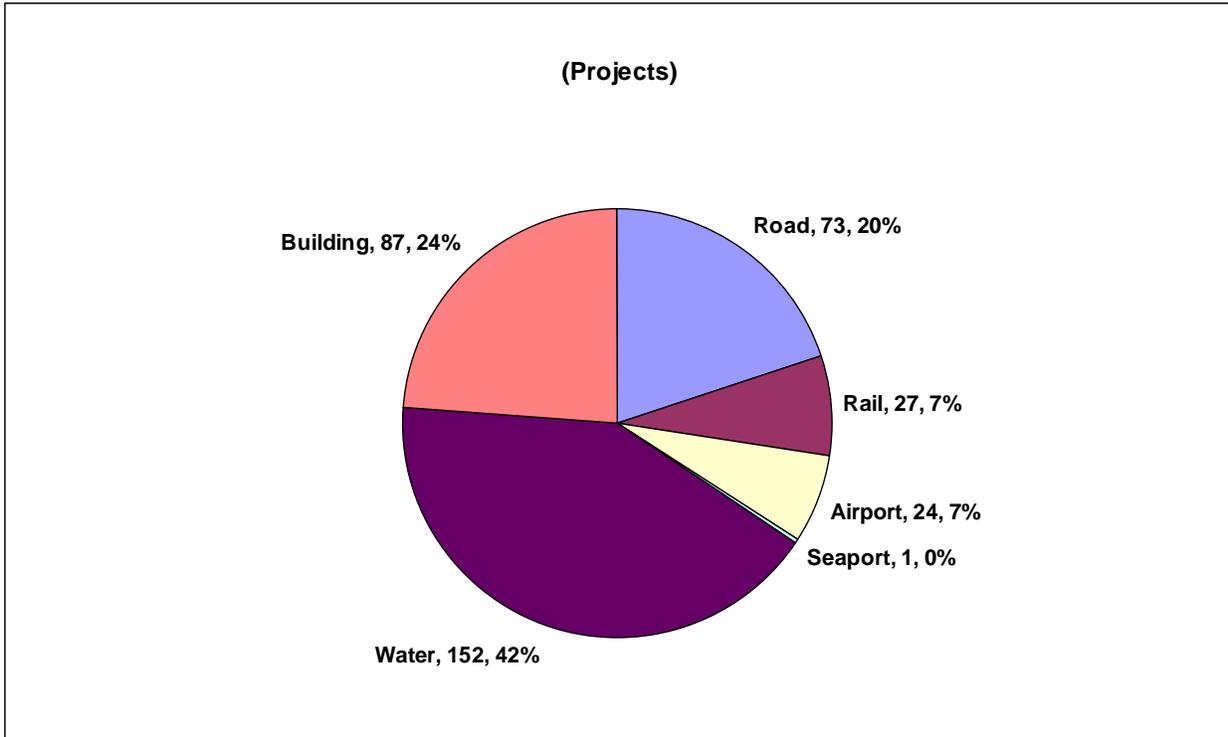
Exhibit 5 –U.S. Infrastructure Projects Planned or Completed since 1985 by Project Type*

Project Type	Total Planned & Funded Since 1985			
	#	%	\$Billion	%
Road	73	20%	\$42.1	40%
Rail	27	7%	\$34.8	33%
Airport	24	7%	\$2.9	3%
Seaport	1	0%	\$0.3	0%
Water	152	42%	\$12.4	12%
Building	87	24%	\$11.6	11%
Subtotal	364	100%	\$104.2	100%

* Based on total PWF database, including projects with partial information

The distribution of PPP infrastructure projects by project type in the U.S. is illustrated in Exhibit 6, on the next page, in terms of number and cost of projects. These pie-charts illustrate the dominant infrastructure projects in the United States, in terms of total costs, are *road* and *rail* projects. However, more *water* and *building* projects are actually planned, although these tend to be much smaller than their *road* and *rail* counterparts which are much more capital intensive and time consuming to complete.

Exhibit 6 – Distribution of United States Infrastructure Projects Planned or Completed since 1985 by Project Type



* Based on total PWF database, including projects with partial information

5. Global PPP Financing or Delivery of Road Projects by Region

When focusing on highway-related infrastructure projects, including roads, bridges, and tunnels, the PWF database contains 656 projects worldwide, representing \$325 billion since 1985, of which half have been completed by October 2004, as listed in Exhibit 7 below. On a regional basis, the most projects since 1985 are in Europe, with 205 projects representing \$139 billion in costs. The second largest region in terms of projects is North America (including the United States, Canada, and Mexico) with 174 projects and \$71 billion in costs. The second largest region in terms of costs is Asia, amounting to \$84 billion for 137 projects.

Exhibit 7 - Worldwide Road Projects Planned or Completed since 1985 by Region*

Region	Total Planned & Funded Since 1985				Total Funded & Completed by 10/04				% Funded & Completed by 10/04	
	#	%	\$Billion	%	#	%	\$Billion	%	% of #	% of \$
Africa	14	2%	\$4.8	1%	7	2%	\$3.7	2%	50%	76%
Asia	137	21%	\$83.9	26%	72	20%	\$44.5	28%	53%	53%
Europe	205	31%	\$139.1	43%	91	25%	\$58.1	37%	44%	42%
Latin America	126	19%	\$26.2	8%	83	23%	\$18.9	12%	66%	72%
North America	174	27%	\$70.8	22%	106	30%	\$32.2	20%	61%	46%
Total	656	100%	\$324.7	100%	359	100%	\$157.3	100%	55%	48%

* Based on total PWF database, including projects with partial information

In terms of average project cost, Europe has the largest highway projects at \$679 million. Asia is second with average highway project cost of \$612 million. North America is third with average highway project cost of \$407 million. The significant difference in the average cost of the PPP projects in Europe and in North America is due to a number of factors, including:

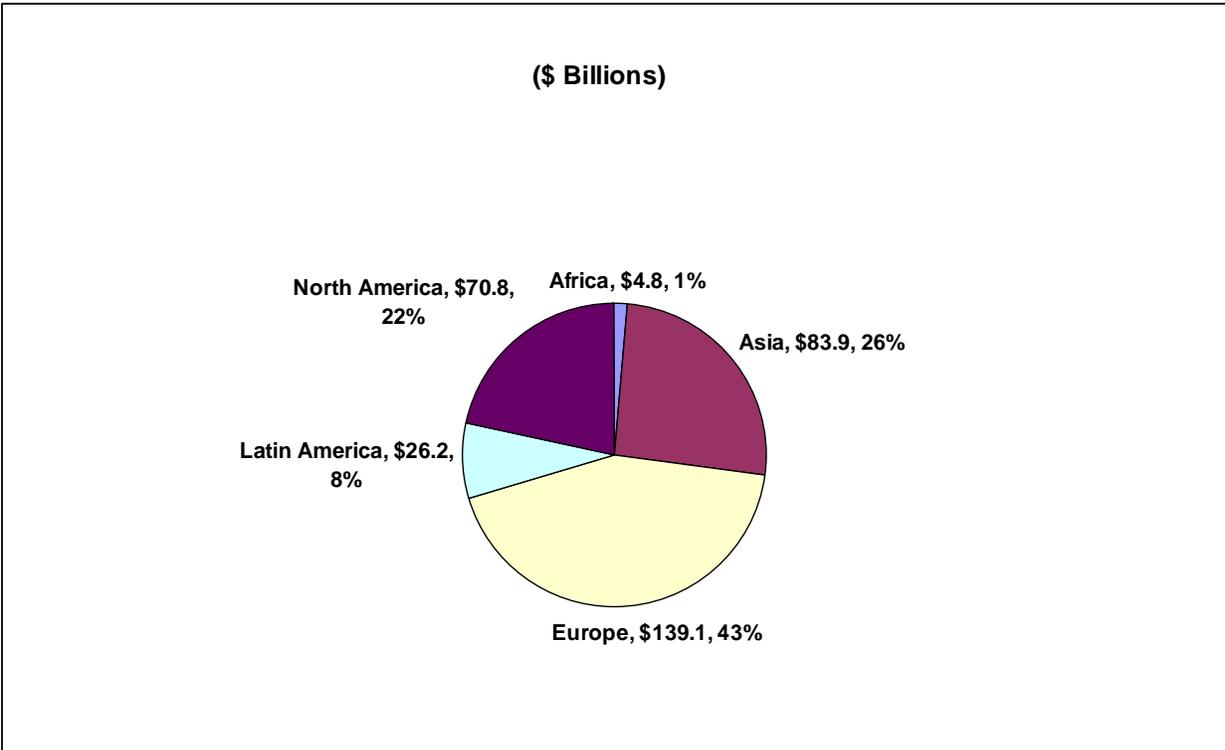
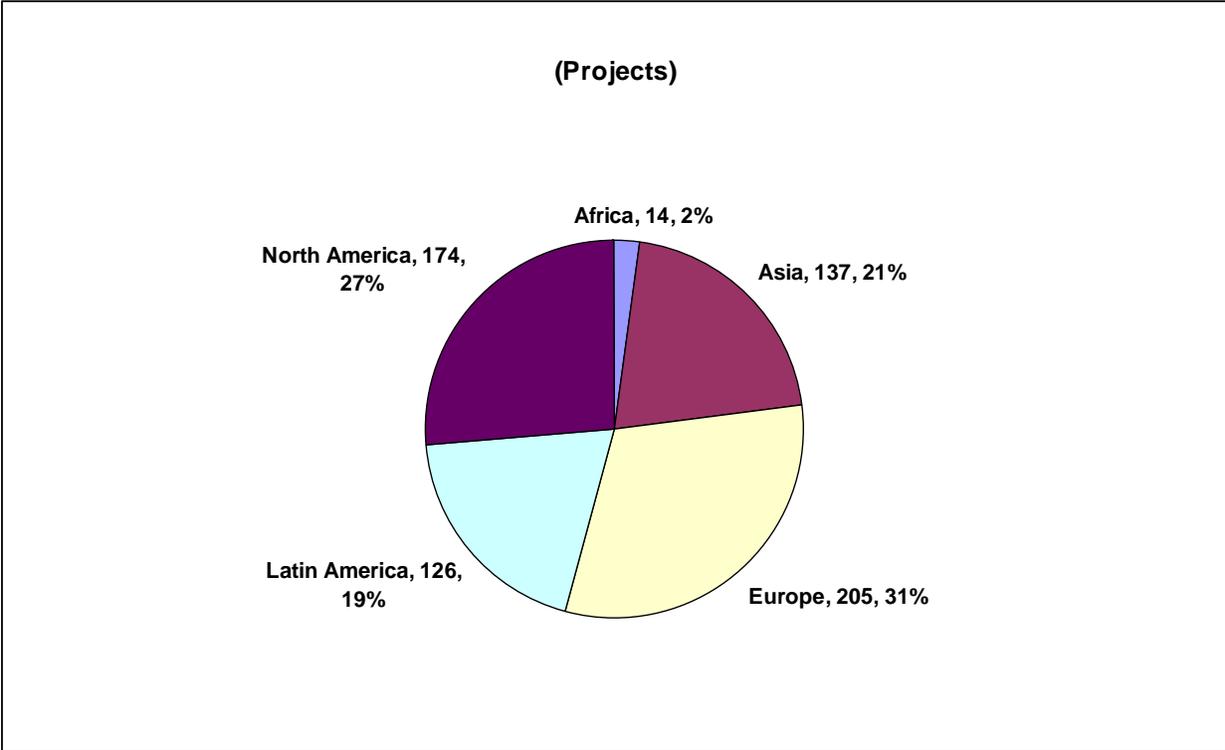
- Larger European projects that reflect national interests versus smaller U.S. projects that reflect state interests.
- Propensity of projects in the U.S. to be smaller in size to accommodate local contractor capabilities and interests.
- Higher proportion of smaller *Design-Build* and *Management Contracts* in the U.S.
- Large number of smaller *Concession* contracts in Mexico.

Europe has the largest PPP program for highway infrastructure and the highest percentage of planned projects yet to be completed. This reflects the continuing interest in Europe in financing and building highway infrastructure to knit the continent together, both economically and physically, in the aftermath of the fall of the Iron Curtain and the rise of the European Union and the Euro.

Exhibits 8 and 9 on the following pages illustrate the predominant role that European nations play in sponsoring highway infrastructure projects funded through PPPs. This is in part a reflection of the absence of dedicated funding sources for highway transportation among European nations, greater traditional reliance on passenger rail service for intercity/international travel across Europe, and a rapid transition in the 1990s from largely public infrastructure systems to a more private financed, developed, and operated highway infrastructure system. The use of PPPs and private financing based largely on toll revenues has enabled many European countries to accelerate their development of transportation accessibility as the continent has become more interdependent from the perspectives of economic development and personal mobility.

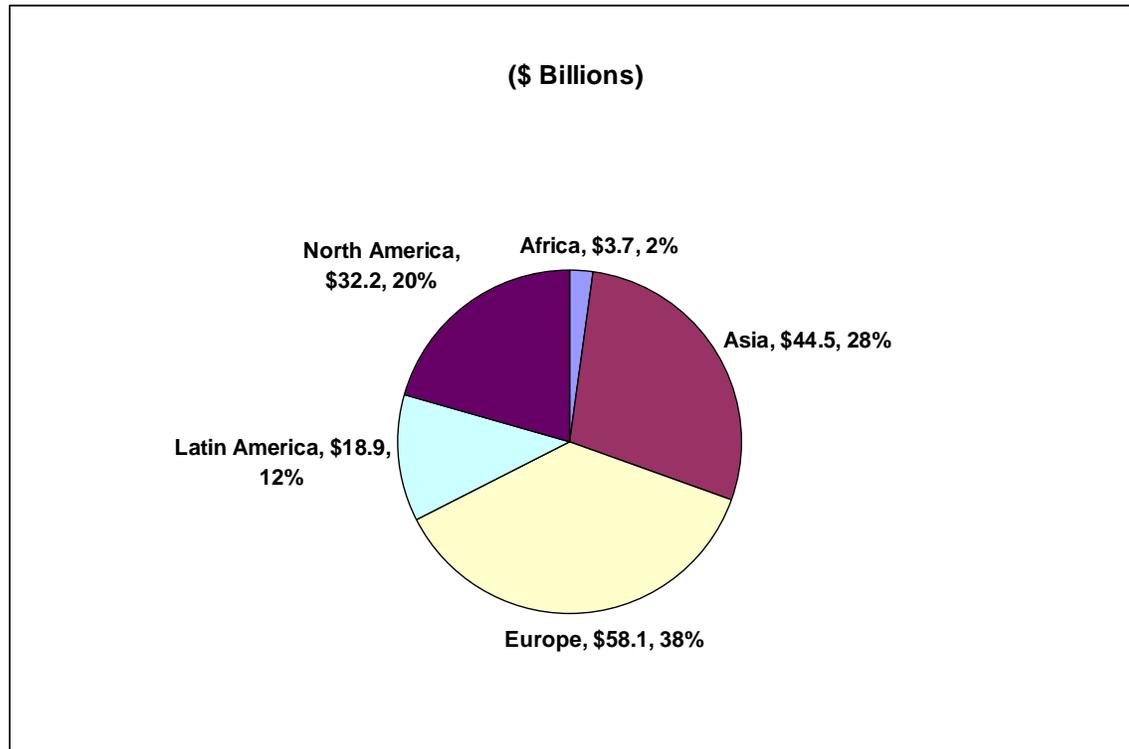
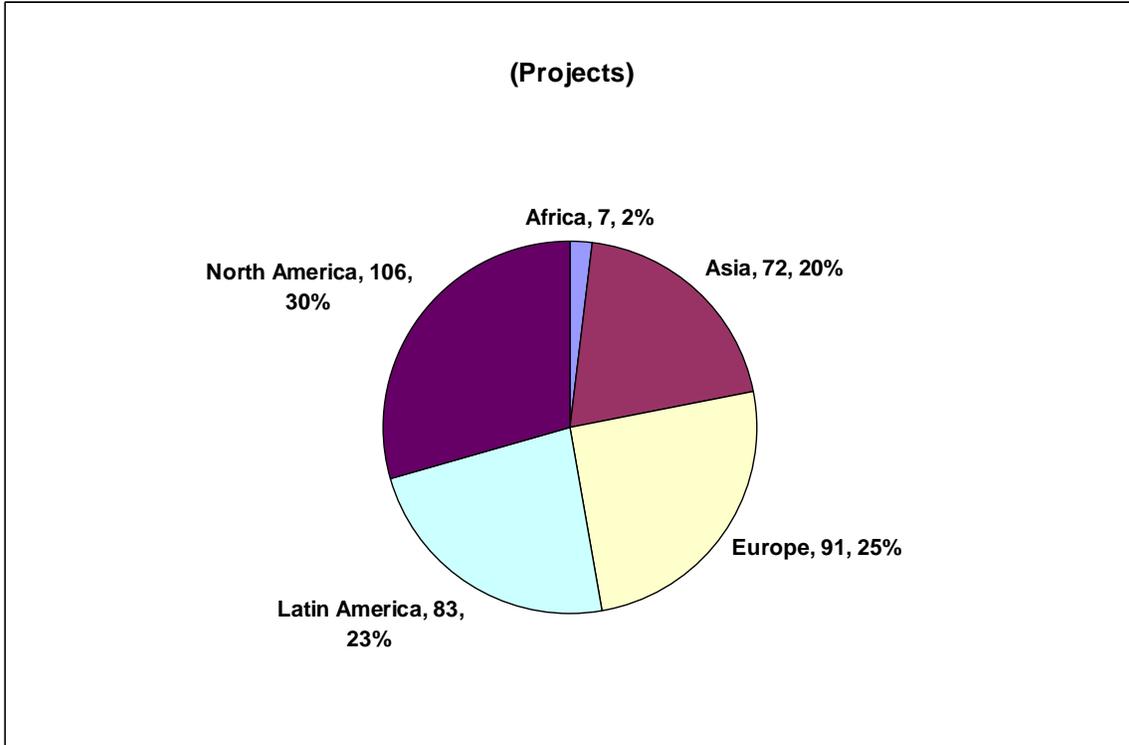
Overall, about half of the highway improvements planned for PPP development have been completed by October 2004.

Exhibit 8 – Worldwide Road Projects Planned & Funded since 1985 by Region



* Based on total PWF database, including projects with partial information

**Exhibit 9 – Worldwide Road Projects Funded & Completed
By October 2004 by Region**



* Based on total PWF database, including projects with partial information

6. Global PPP Financing or Delivery of Road Projects by Contract Type

Several types of contracting arrangements are used around the world to finance and delivery highway-related infrastructure projects, including roads, bridges, and tunnels. The PWF database lists the various contracting approaches used or proposed for each project. These contracting approaches generally fell into the following seven categories:

- **Build-Operate-Transfer/Build-Transfer-Operate (BOT/BTO)** – this is a project delivery method typically involving the design, construction, finance, and operation of a facility whereby the contract team acquires ownership of the facility until the end of the construction period or the contract term, at which time ownership of the facility is returned to the original public sector sponsor.
- **Build-Own-Operate (BOO)** – this is a project delivery method similar to *BOT* whereby the contract team both owns and operates the facility.
- **Concession** – this is a contract arrangement which grants the contract team full responsibility to finance, build, operate, and/or maintain the facility as a franchisee for a specified period of time, whereby the private sector team takes most of the project and financial risks and potential rewards for the term of the *Concession* contract. In some cases, *Concessions* have been granted for the operation and maintenance of facilities built by others, as a comprehensive form of *Management Contract*.
- **Design-Build (DB)** –the contract team is responsible for both the design and construction phases of a project as part of a single contract. This is in contrast to the traditional project delivery approach used for highway projects in the United States, *Design-Bid-Build (DBB)*, in which the design firm and the construction contractor are separately responsible for the design and construction phases of a project. *Design-build* contracts typically do not involve the use of private financing. However, they are still considered PPP projects because of the added responsibility and risk assumed by the private sector Design-Build team.
- **Design-Build-Operate-Maintain (DBOM)** – the contract team is responsible for design, construction, operation, and maintenance of the facility for a specified period of time, whereby payment beyond project completion is predicated on meeting certain prescribed performance standards relating to physical condition, capacity, congestion, and/or ride quality. This is an extension of *Design-Build* that provides an inherent incentive for the design-builder to provide a better quality plan and project by creating a lifecycle responsibility and accountability for the performance of the facility by the design-builder.
- **Design-Build-Finance-Operate (DBFO)** - this is an extension of the *DBOM* project delivery method in which the contract team is also responsible for financing the project and takes the risks of project financing during the contract term. This contract approach is similar to *BOT/BTO* becomes a *Concession* when the private sector team acts as a franchisee with most of the project and financial risks and potential rewards.

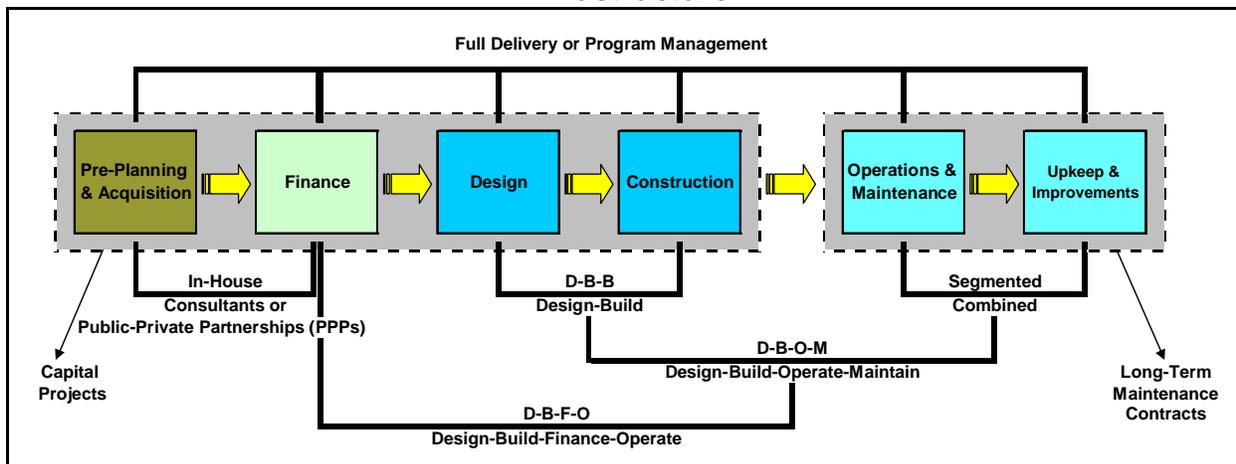
- **Management Contract** – this is a contract arrangement under which the contract team manages the provision of specified functions at certain performance standards over a set period of time, often with the provision of subsequent time extensions to the contract. Like *Design-Build*, these contracts typically do not involve the use of private financing but do represent additional responsibilities and risks for the private sector asset management team.

In addition to the above terms, two more contracting approaches are noted in the PWF database. These include:

- **Asset Sale** – when the facility is sold to a private sector team which holds full responsibility and liability for the project and its risks and returns. There are very few true *Asset Sales* involving highway-related facilities and so this contracting approach is included in the *Concession* category defined above.
- **Joint Development Agreement (JDA)** – this is a contract arrangement whereby both the public sector sponsor and the private sector contract team enter into a joint agreement to share responsibilities for developing, financing, operating, and preserving the facility. This contract approach is used where there is a strong interest by the sponsoring agency to retain a substantial portion of control over the project and interest in the proceeds of the project. For the purposes of this report, *JDA* contracts are included in the *Concession* category defined above.

Several of these contracting approaches are closely related and are sometimes used interchangeably in the PWF database, even for the same project. Those contracting approaches that most closely related to the description of the project and its financing approach were used to characterize the road projects according to contracting approach. As shown in Exhibit 10 below, the different contracting approaches combine various phases of the project life cycle. What makes them all part of the family of public-private partnerships is the sharing of roles, responsibilities, risks and rewards between the public and private members of the partnership.

Exhibit 10 - Alternative Contractual Arrangements for Delivering Highway Infrastructure*



* Based on a scheme developed by Pekka Pakkala. *Innovative Project Delivery Methods for Infrastructure – An International Perspective*. Finnish Road Enterprise, Helsinki, 2002, p. 32.

On a worldwide basis, the breakdown of highway-related infrastructure projects financed through PPP arrangements by contract type is shown in Exhibit 11. When eliminating projects that have not specified a budget or clearly defined a contract type, the PWF database contains 599 highway-related projects worldwide, representing \$322 billion since 1985.

On a worldwide basis, the predominant contracting approaches (shown in bolded text) are: *Concession* and *BOT/BTO*. Each of these contract approaches places a high degree of responsibility and accountability on the private sector team, with the public sector sponsor serving primarily as a contract administrator. All line functions are included in the contract scope, and maximum flexibility is provided to the contract team to develop the project in the most cost-effective manner. This is in sharp contrast to the traditional *Design-Bid-Build* approach to delivering highway projects in the United States. Under *DBB*, the public sponsor is much more involved in all phases of the project, often uses prescriptive specifications, and is ultimately responsible for the results of the design process.

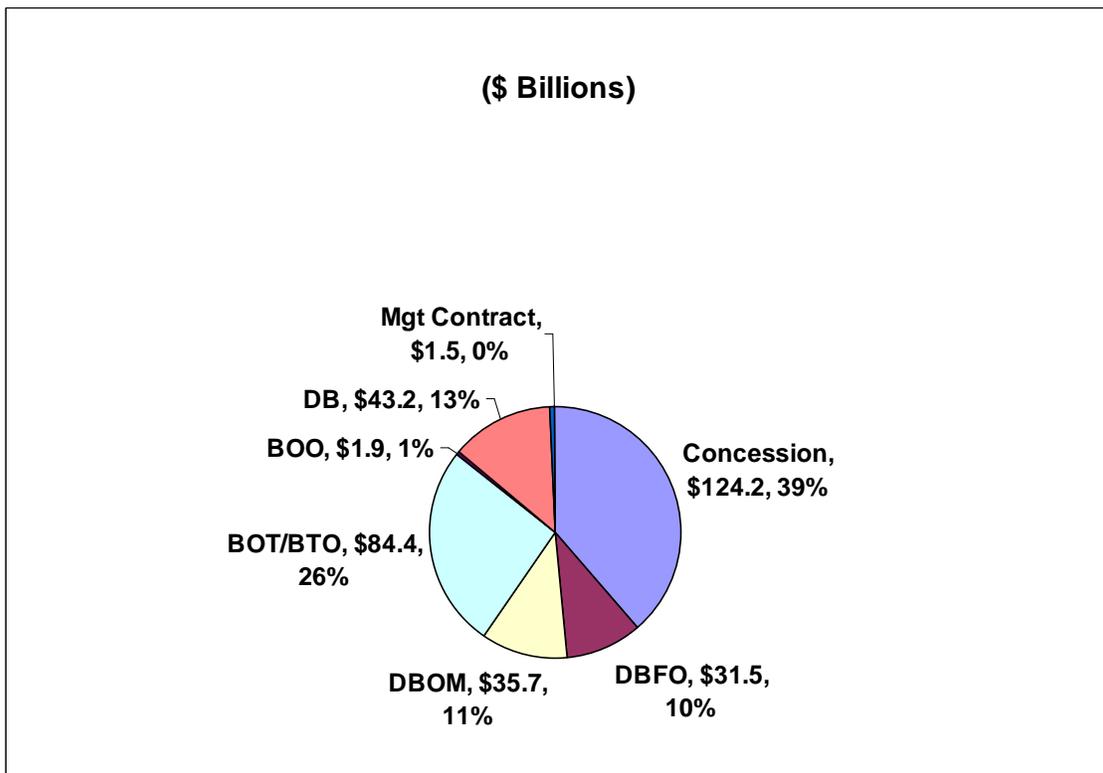
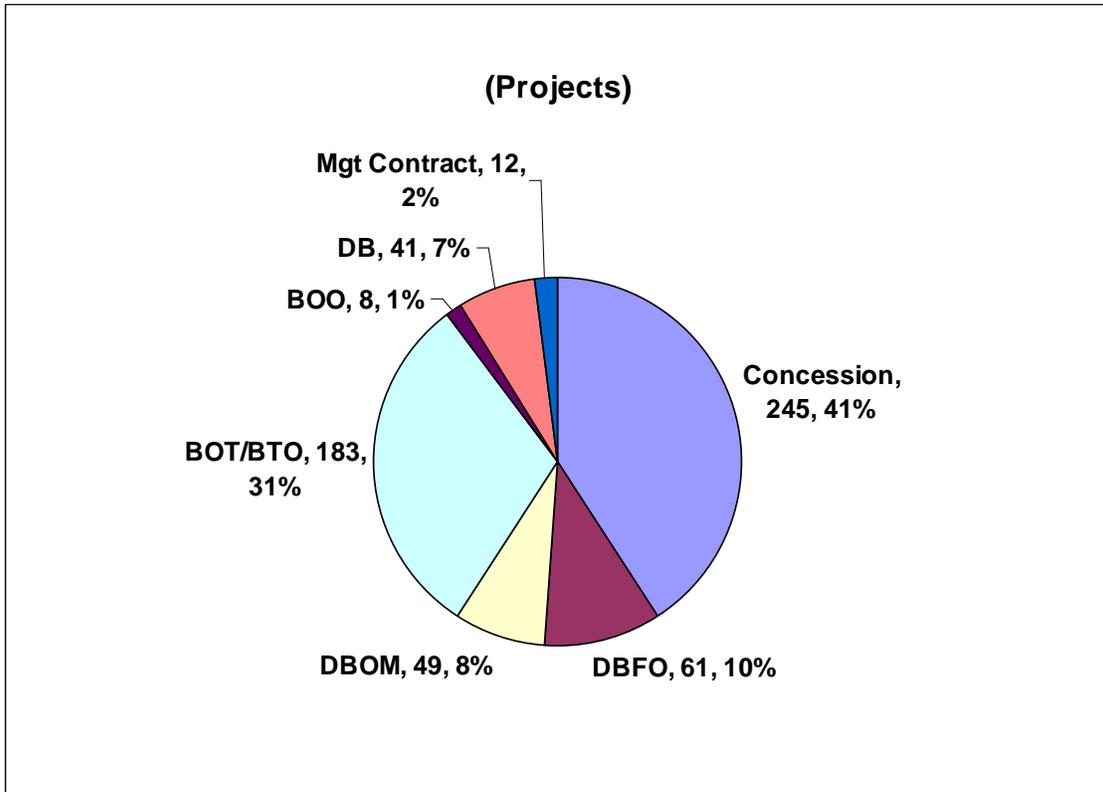
Exhibit 11 – Worldwide Road Projects Planned or Completed since 1985 by Contract Type

Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Concession	245	41%	\$124.2	39%	\$0.507
DBFO	61	10%	\$31.5	10%	\$0.516
DBOM	49	8%	\$35.7	11%	\$0.728
BOT/BTO	183	31%	\$84.4	26%	\$0.461
BOO	8	1%	\$1.9	1%	\$0.239
DB	41	7%	\$43.2	13%	\$1.054
Mgt Contract	12	2%	\$1.5	0%	\$0.127
Total	599	100%	\$322.4	100%	\$0.538

Overall, the most prominent contracting approach for delivering highway-related PPP projects is a *Concession*, with about a 40 percent share (as shown in Exhibit 11). Second is *BOT/BTO* at just over a quarter share of the total project costs. Many *Concession* projects are set up as *DBFO* or *DBOM* contracts. When combined, these three related contract types comprise a 60 percent share of the value of highway-related PPP projects. The more limited contracting approaches, *DB* and *Management Contracts*, represent significantly smaller portions of the PPP project total. The contract approaches with the largest average project cost are *DB* and *DBOM*, respectively.

The distribution of PPP road projects financed since 1985 by contract approach is shown in Exhibit 12 on the next page, in terms of the number of projects and the cost of these projects. These exhibits clearly demonstrate the predominant role *Concession* contracting plays in highway-related project development and financing.

Exhibit 12 – Distribution of Worldwide Road Projects Planned or Completed since 1985 by Contract Type



7. Regional PPP Financing or Delivery of Road Projects by Contract Type

Exhibit 13 shows the distribution of PPP road projects by contract type on a regional basis. The following summarizes the information contained in Exhibit 13:

- Most of the projects in Europe are *Concession* and *BOT/BTO* contracts. Project costs average about \$690 million in Europe.
- Most of the projects in Asia & Far East are *Concession* and *BOT/BTO* contracts, including several *Joint Development Agreement (JDA)* projects and *Asset Sale* projects. Project costs average about \$675 million in Asia & Far East.
- Most of the projects in Latin America & Caribbean are *Concession* and *BOT/BTO* contracts, with project costs averaging about \$255 million.
- Most of the projects in North America are *Concession* contracts (particularly in Mexico which include several *Asset Sale* projects) and *DB* contracts (particularly in the U.S.). *DMOB* projects have the largest average contract value in North America. Overall, project costs average about \$435 million in North America.
- Few projects are in Africa & Middle East, mostly *BOT/BTO* and *DBFO* contracts. Project costs average \$400 million in Africa & Middle East.
- On a worldwide basis, PPP projects in the road category use a variety of contract types, with projects averaging about \$540 million. The exception to this is *Management Contract*, whose average cost is less than \$130 million.
- In the U.S., the predominant PPP contract types have been *DB* and *Management Contract*. In addition, there are selected road projects using *BOO*, *BOT/BTO*, *DBOM*, *DBFO*, or *Joint Development Agreement* contracts, which reflects the growing interest in using various forms of PPPs to expedite projects in the U.S.

As noted above, the predominant contracting approach is *Concession* for each region except Africa & Middle East. The next most prominent contracting approach is *BOT/BTO* for each region except North America. In North America, the second most prominent contracting approach is *DB* in terms of number and *DBOM* in terms of cost (reflecting the increased scope of *DBOM* versus *DB* projects). Both of these contracting approaches are closer to the traditional *DBB* model of project delivery than the *BOT/BTO* approaches used overseas. This may portend the future direction of highway infrastructure delivery and PPPs.

The largest highway projects in North America use the *DBOM* contracting approach, with *DB* second in average cost. In contrast, the largest PPP highway projects in Europe and Asia use the *DB* contracting approach due to the complexity and huge size of these projects. This is based on a small group (only four projects) of very large projects in each region. Among the more frequently used contracting approaches, the largest European and Asian highway projects involve *Concession* and *BOT/BTO* contracts.

Figure 13 – Regional Road Projects Planned or Completed since 1985 by Contract Type*

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Africa & Middle East	Concession	1	8%	\$0.0	1%	\$0.039
	DBFO	3	25%	\$1.6	33%	\$0.527
	DBOM	2	17%	\$1.5	32%	\$0.761
	BOT/BTO	5	42%	\$1.5	31%	\$0.301
	BOO	1	8%	\$0.2	3%	\$0.150
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	12	100%	\$4.8	100%	\$0.400
Asia & Far East	Concession	49	40%	\$21.8	26%	\$0.444
	DBFO	5	4%	\$9.8	12%	\$1.956
	DBOM	2	2%	\$0.2	0%	\$0.078
	BOT/BTO	61	50%	\$34.9	42%	\$0.572
	BOO	1	1%	\$0.1	0%	\$0.143
	DB	4	3%	\$15.8	19%	\$3.946
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	122	100%	\$82.5	100%	\$0.677
Europe	Concession	69	34%	\$61.7	45%	\$0.894
	DBFO	45	22%	\$18.3	13%	\$0.407
	DBOM	26	13%	\$14.6	11%	\$0.563
	BOT/BTO	53	26%	\$31.4	23%	\$0.592
	BOO	1	0%	\$0.9	1%	\$0.936
	DB	4	2%	\$10.6	8%	\$2.648
	Mgt Contract	3	1%	\$0.9	1%	\$0.312
	Subtotal	201	100%	\$138.4	100%	\$0.689
Latin America & Caribbean	Concession	45	44%	\$11.6	44%	\$0.257
	DBFO	3	3%	\$0.7	3%	\$0.234
	DBOM	5	5%	\$1.7	7%	\$0.346
	BOT/BTO	50	49%	\$12.4	47%	\$0.248
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	103	100%	\$26.4	100%	\$0.256
North America	Concession	81	50%	\$29.1	41%	\$0.359
	DBFO	5	3%	\$1.1	2%	\$0.228
	DBOM	14	9%	\$17.6	25%	\$1.259
	BOT/BTO	14	9%	\$4.3	6%	\$0.305
	BOO	5	3%	\$0.7	1%	\$0.137
	DB	33	20%	\$16.8	24%	\$0.510
	Mgt Contract	9	6%	\$0.6	1%	\$0.066
	Subtotal	161	100%	\$70.2	100%	\$0.436
Worldwide	Concession	245	41%	\$124.2	39%	\$0.507
	DBFO	61	10%	\$31.5	10%	\$0.516
	DBOM	49	8%	\$35.7	11%	\$0.728
	BOT/BTO	183	31%	\$84.4	26%	\$0.461
	BOO	8	1%	\$1.9	1%	\$0.239
	DB	41	7%	\$43.2	13%	\$1.054
	Mgt Contract	12	2%	\$1.5	0%	\$0.127
	Total	599	100%	\$322.4	100%	\$0.538

N/A – none available

* Omits projects included in PWF database that lack sufficient information to determine cost

8. Regional/National PPP Financing or Delivery of Road Projects by Project Type

There are differences in the nature, duration, and type of PPP arrangements used for various kinds of road projects in different regions of the world, and among the nations comprising these regions. These are listed and described on the following pages of this section. The information presented is organized by road project type for each region, based on the PWF database. These include:

- Non-Toll Highways
- Toll Highways
- Toll Bridges
- Toll Tunnels
- Toll Bridges & Tunnels

The principal nations in each region with highway-related PPP projects are identified along with their predominant contract types. In addition, the typical project duration and average project costs by contract type are presented by region.

Non-Toll Highways

Exhibit 14 shows the distribution of non-toll highway projects by contract type on a regional basis. According to this data, the following insights are noted for non-toll highway projects involving PPP arrangements:

- Most non-toll highway projects involving PPP arrangements for financing or delivery are in Europe, predominantly in the U.K., Spain, and Portugal. Many of these projects were financed by shadow tolls and involve either a *DBFO* or *DBOM* contract with terms of generally 30 years. Project costs average \$400 million.
- Shadow tolling appears to be declining in Europe as a basis for highway project funding.
- Other non-toll highway projects are in the U.S. and Canada, many of which are *DB* contracts. Other contract delivery approaches in North America include *DBFO* (most involving shadow tolls of 20-30 years duration, primarily in Canada), *DBOM* (of 10-20 years duration), and *Contract Management* (of 5-7 years duration). Project costs average \$300 million in North America.
- None of the other regions have non-toll highway projects listed in the PWF database.

**Exhibit 14 – Non-Toll Highway Projects Planned or Completed
since 1985 by Region and Contract Type***

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$B/Project
Africa & Middle East	Concession	0		\$0.0		N/A
	DBFO	0		\$0.0		N/A
	DBOM	0		\$0.0		N/A
	BOT/BTO	0		\$0.0		N/A
	BOO	0		\$0.0		N/A
	DB	0		\$0.0		N/A
	Mgt Contract	0		\$0.0		N/A
	Subtotal	0		\$0.0		N/A
Asia & Far East	Concession	0		\$0.0		N/A
	DBFO	0		\$0.0		N/A
	DBOM	0		\$0.0		N/A
	BOT/BTO	0		\$0.0		N/A
	BOO	0		\$0.0		N/A
	DB	0		\$0.0		N/A
	Mgt Contract	0		\$0.0		N/A
	Subtotal	0		\$0.0		N/A
Europe UK Spain Portugal	Concession	3	6%	\$2.0	11%	\$0.656
	DBFO	24	51%	\$7.8	42%	\$0.324
	DBOM	14	30%	\$7.5	40%	\$0.538
	BOT/BTO	3	6%	\$0.5	3%	\$0.164
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	3	6%	\$0.9	5%	\$0.312
	Subtotal	47	100%	\$18.7	100%	\$0.398
Latin America & Caribbean	Concession	0		\$0.0		N/A
	DBFO	0		\$0.0		N/A
	DBOM	0		\$0.0		N/A
	BOT/BTO	0		\$0.0		N/A
	BOO	0		\$0.0		N/A
	DB	0		\$0.0		N/A
	Mgt Contract	0		\$0.0		N/A
	Subtotal	0		\$0.0		N/A
North America US Canada	Concession	0		\$0.0		N/A
	DBFO	5	15%	\$1.1	11%	\$0.228
	DBOM	5	15%	\$1.4	13%	\$0.271
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	15	45%	\$7.1	70%	\$0.472
	Mgt Contract	8	24%	\$0.5	5%	\$0.060
	Subtotal	33	100%	\$10.1	100%	\$0.305
Total	Concession	3	4%	\$2.0	7%	\$0.656
	DBFO	29	36%	\$8.9	31%	\$0.308
	DBOM	19	24%	\$8.9	31%	\$0.468
	BOT/BTO	3	4%	\$0.5	2%	\$0.164
	BOO	0	0%	\$0.0	0%	N/A
	DB	15	19%	\$7.1	25%	\$0.472
	Mgt Contract	11	14%	\$1.4	5%	\$0.129
	Total	80	100%	\$28.8	100%	\$0.360

N/A – none available

* Omits projects included in PWF database that lack sufficient information to determine cost

Toll Highways

Exhibit 15 shows the distribution of toll highway projects by contract type on a regional basis. According to this data, the following insights are noted for toll highway projects involving PPP arrangements:

- Toll highway projects involving PPP arrangements for financing or delivery are found in all regions, with the largest number and costs in Europe, North America, and Asia & Far East.
- Most of the toll highway projects in Europe are located in Spain, Germany, Greece, and Ireland. These are mostly *Concession* and *BOT/BTO* contracts averaging 30 years in duration. The U.K. has only recently begun to build toll motorways, having used primarily shadow tolling for highway financing in the past. Project costs average \$680 million in Europe.
- Most of the toll highway projects in Asia & Far East are located in China, Malaysia, South Korea, Australia, and India. These are mostly *BOT/BTO* contracts averaging 30 years in duration. There are several *Joint Development Agreement (JDA)* projects in China. Project costs average about \$645 million in Asia & Far East.
- Most of the toll highway projects in Latin America & Caribbean are located in Brazil, Chile, Peru, and Argentina. These are mostly *Concession* and *BOT/BTO* contracts averaging 25-30 years in duration. Project costs average about \$260 million in Latin America & Caribbean.
- Toll highway projects in North America are located in Mexico, U.S., and Canada. These are mostly *Concession* contracts (particularly in Mexico) averaging 30 years in duration. Some of the projects in Mexico involve *Asset Sales*. Many of the projects in the U.S. are *DB* contracts. Project costs average about \$450 million in North America.
- Few toll highway projects are in Africa & Middle East, spread across various contract types excluding *DB* and *Contract Management*. Most involve 30 year durations. Project costs average about \$475 million in Africa & Middle East.

**Exhibit 15 – Toll Highway Projects Planned or Completed
since 1985 by Region and Contract Type***

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Africa & Middle East So Africa	Concession	1	13%	\$0.0	1%	\$0.039
	DBFO	3	38%	\$1.6	42%	\$0.527
	DBOM	2	25%	\$1.5	40%	\$0.761
	BOT/BTO	2	25%	\$0.7	17%	\$0.325
	BOO	0	0%	\$0.0	0%	\$0.000
	DB	0	0%	\$0.0	0%	\$0.000
	Mgt Contract	0	0%	\$0.0	0%	\$0.000
	Subtotal	8	100%	\$3.8	100%	\$0.474
Asia & Far East China Malaysia So Korea Australia Indonesia India	Concession	27	33%	\$15.4	30%	\$0.572
	DBFO	2	2%	\$7.2	14%	\$3.600
	DBOM	2	2%	\$0.2	0%	\$0.078
	BOT/BTO	47	58%	\$28.7	55%	\$0.610
	BOO	1	1%	\$0.1	0%	\$0.143
	DB	2	2%	\$0.5	1%	\$0.228
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	81	100%	\$52.1	100%	\$0.643
Europe Spain Germany Greece Ireland Portugal France	Concession	58	49%	\$39.9	49%	\$0.689
	DBFO	16	13%	\$8.4	10%	\$0.525
	DBOM	8	7%	\$6.1	7%	\$0.757
	BOT/BTO	36	30%	\$25.6	32%	\$0.712
	BOO	1	1%	\$0.9	1%	\$0.936
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	119	100%	\$81.0	100%	\$0.680
Latin America & Caribbean Brazil Chile Peru Argentina Columbia	Concession	44	47%	\$11.2	46%	\$0.253
	DBFO	1	1%	\$0.4	2%	\$0.442
	DBOM	5	5%	\$1.7	7%	\$0.346
	BOT/BTO	43	46%	\$11.0	45%	\$0.255
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	93	100%	\$24.3	100%	\$0.261
North America Mexico US Canada	Concession	79	85%	\$27.3	53%	\$0.345
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	8	7%	\$12.3	24%	\$1.534
	BOT/BTO	10	9%	\$3.3	6%	\$0.332
	BOO	0	0%	\$0.0	0%	N/A
	DB	16	14%	\$8.4	16%	\$0.524
	Mgt Contract	1	1%	\$0.1	0%	\$0.108
	Subtotal	114	116%	\$51.4	100%	\$0.451
Total	Concession	209	50%	\$93.9	44%	\$0.449
	DBFO	22	5%	\$17.6	8%	\$0.801
	DBOM	25	6%	\$21.7	10%	\$0.869
	BOT/BTO	138	33%	\$69.3	33%	\$0.502
	BOO	2	0%	\$1.1	1%	\$0.540
	DB	18	4%	\$8.8	4%	\$0.491
	Mgt Contract	1	0%	\$0.1	0%	\$0.108
	Total	415	100%	\$212.5	100%	\$0.512

N/A – none available

* Omits projects included in PWF database that lack sufficient information to determine cost

Toll Bridges

Exhibit 16 shows the distribution of toll bridge projects by contract type on a regional basis. According to this data, the following insights are noted for toll bridge projects involving PPP arrangements:

- Toll bridge projects involving PPP arrangements for financing or delivery are found in all regions, with the largest number and costs in Asia & Far East, Europe, and North America.
- Most of the toll bridge projects in Asia & Far East are located in China and South Korea. These are mostly *Concession* and *BOT/BTO* contracts averaging 30 years in duration. There are several *Joint Development Agreement (JDA)* projects and *Asset Sale* projects in China. Project costs average about \$395 million in Asia & Far East.
- Most of the toll bridge projects in Europe are located in U.K., Germany, and Ireland. These are mostly *BOT/BTO* contracts averaging 30 years in duration. Project costs average about \$745 million in Europe.
- There are several toll bridge projects in Latin America & Caribbean, mostly located in Brazil and Argentina. These are *BOT/BTO* contracts averaging 30 years in duration. Project costs average about \$230 million in Latin America & Caribbean.
- Toll bridge projects in North America are located in the U.S. and Canada. These include *Concession*, *BOT/BTO*, and *DB* contracts with durations ranging from 25 to 99 years. Several smaller *BOO* projects in the U.S. involve unending franchises granted to the private sector developer under state law. Project costs average about \$350 million in North America.
- Few toll bridge projects are in Africa & Middle East, involving *BOT/BTO* and *BOO* contracts of 30-year average duration. Project costs average \$125 million in Africa & Middle East.

**Exhibit 16 - Toll Bridge Projects Planned or Completed
since 1985 by Region and Contract Type***

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Africa & Middle East	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	1	50%	\$0.1	40%	\$0.100
	BOO	1	50%	\$0.2	60%	\$0.150
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	2	100%	\$0.3	100%	\$0.125
Asia & Far East China So Korea	Concession	18	62%	\$5.4	47%	\$0.300
	DBFO	2	7%	\$1.8	15%	\$0.879
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	8	28%	\$3.4	30%	\$0.425
	BOO	0	0%	\$0.0	0%	N/A
	DB	1	3%	\$0.9	8%	\$0.930
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	29	100%	\$11.5	100%	\$0.396
Europe UK Germany Ireland	Concession	4	20%	\$1.1	7%	\$0.280
	DBFO	5	25%	\$2.1	14%	\$0.423
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	9	45%	\$4.2	28%	\$0.468
	BOO	0	0%	\$0.0	0%	N/A
	DB	2	10%	\$7.5	50%	\$3.745
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	20	100%	\$14.9	100%	\$0.747
Latin America & Caribbean Argentina Brazil	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	6	100%	\$1.4	100%	\$0.228
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	6	100%	\$1.4	100%	\$0.228
North America US Canada	Concession	2	17%	\$1.8	43%	\$0.912
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	4	33%	\$0.9	22%	\$0.236
	BOO	4	33%	\$0.1	2%	\$0.021
	DB	2	17%	\$1.4	32%	\$0.680
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	12	100%	\$4.2	100%	\$0.351
Total	Concession	24	35%	\$8.3	26%	\$0.347
	DBFO	7	10%	\$3.9	12%	\$0.553
	DBOM	0	0%	\$0.0	0%	N.A
	BOT/BTO	28	41%	\$10.0	31%	\$0.358
	BOO	5	7%	\$0.2	1%	\$0.047
	DB	5	7%	\$9.8	30%	\$1.956
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Total	69	100%	\$32.2	100%	\$0.467

N/A – none available

- Omits projects included in PWF database that lack sufficient information to determine cost

Toll Tunnels

Exhibit 17 shows the distribution of toll tunnel projects by contract type on a regional basis. According to this data, the following insights are noted for toll tunnel projects involving PPP arrangements:

- Toll tunnel projects involving PPP arrangements for financing or delivery are found in all regions, with most located in Europe.
- Toll tunnel projects are spread across Europe, with the largest number located in Germany. These are mostly *Concession*, *DBOM*, and *BOT/BTO* contracts ranging from 27 to 99 years in duration. Project costs average \$1.5 billion in Europe, with the *Concession* projects significantly larger on average than the *DBOM* or *BOT/BTO* projects.
- Most of the toll tunnel projects in Asia & Far East are located in Hong Kong and Australia. These are mostly *BOT/BTO* contracts averaging 30 years in duration. Project costs average about \$450 million in Asia & Far East.
- There are two toll tunnel projects in Latin America & Caribbean. These are *DBFO* and *BOT/BTO* contracts ranging from 23 to 30 years in duration. Project costs average about \$120 million in Latin America & Caribbean.
- There is one toll tunnel project in North America. This is a \$4 billion *DBOM* contract in the U.S..
- Two toll bridge projects are in Africa & Middle East with *BOT/BTO* contracts of 35-year durations. Project costs average about \$380 million in Africa & Middle East.

**Exhibit 17 - Toll Tunnel Projects Planned or Completed
since 1985 by Region and Contract Type***

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Africa & Middle East Egypt Israel	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	2	100%	\$0.8	100%	\$0.378
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	2	100%	\$0.8	100%	\$0.378
Asia & Far East Australia China	Concession	3	30%	\$0.8	19%	\$0.278
	DBFO	1	10%	\$0.8	18%	\$0.821
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	6	60%	\$2.8	63%	\$0.471
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	10	100%	\$4.5	100%	\$0.448
Europe Germany	Concession	4	29%	\$18.6	88%	\$4.662
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	4	29%	\$1.0	5%	\$0.261
	BOT/BTO	5	36%	\$1.0	5%	\$0.201
	BOO	0	0%	\$0.0	0%	N/A
	DB	1	7%	\$0.4	2%	\$0.400
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	14	100%	\$21.1	100%	\$1.507
Latin America & Caribbean	Concession	0	0%	\$0.0	0%	N/A
	DBFO	1	50%	\$0.2	79%	\$0.190
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	1	50%	\$0.1	21%	\$0.051
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	2	100%	\$0.2	100%	\$0.121
North America	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	1	100%	\$4.0	100%	\$4.000
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	1	100%	\$4.0	100%	\$4.000
Total	Concession	7	24%	\$19.5	64%	\$2.783
	DBFO	2	7%	\$1.0	3%	\$0.506
	DBOM	5	17%	\$5.0	17%	\$1.009
	BOT/BTO	14	48%	\$4.6	15%	\$0.331
	BOO	0	0%	\$0.0	0%	N/A
	DB	1	3%	\$0.4	1%	\$0.400
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Total	29	100%	\$30.6	100%	\$1.054

N/A – none available

* Omits projects included in PWF database that lack sufficient information to determine cost

Toll Bridges & Tunnels

Exhibit 18 shows the distribution of toll bridge and tunnel projects by contract type on a regional basis. According to this data, the following insights are noted for toll bridge & tunnel projects involving PPP arrangements:

- There are only a few toll bridge & tunnel projects involving PPP arrangements for financing or delivery found in most of the regions, with none in Africa & Middle East.
- Toll bridge & tunnel projects are delivered as *Concession*, *DBFO*, *DB*, and *BOO* contracts.
- Toll bridge & tunnel projects range in cost from \$70 million to over \$14 billion, with an average of \$3 billion. Both Asia & Far East and Europe have one very large toll bridge & tunnel project, each delivered as a DB contract. The one toll bridge & tunnel project in North America involves expanding a current border crossing facility between the U.S. and Canada.

**Exhibit 18 - Toll Bridge & Tunnel Projects Planned or Completed
since 1985 by Region and Contract Type***

Region	Contract Type	Number	Percent	\$ Billion	Percent	\$/Project
Africa & Middle East	Concession	0		\$0.0		N/A
	DBFO	0		\$0.0		N/A
	DBOM	0		\$0.0		N/A
	BOT/BTO	0		\$0.0		N/A
	BOO	0		\$0.0		N/A
	DB	0		\$0.0		N/A
	Mgt Contract	0		\$0.0		N/A
	Subtotal	0		\$0.0		N/A
Asia & Far East Japan So Korea	Concession	1	50%	\$0.1	1%	\$0.100
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	1	50%	\$14.4	99%	\$14.400
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	2	100%	\$14.5	100%	\$7.250
Europe Denmark/ Sweden	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	1	100%	\$2.7	100%	\$2.700
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	1	100%	\$2.7	100%	\$2.700
Latin America & Caribbean Chile	Concession	1	50%	\$0.4	85%	\$0.400
	DBFO	1	50%	\$0.1	15%	\$0.070
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	2	100%	\$0.5	100%	\$0.235
North America US/Canada	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	1	100%	\$0.6	100%	\$0.600
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	1	100%	\$0.6	100%	\$0.600
Total	Concession	2	33%	\$0.5	3%	\$0.250
	DBFO	1	17%	\$0.1	0%	\$0.070
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	1	17%	\$0.6	3%	\$0.600
	DB	2	33%	\$17.1	94%	\$8.550
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Total	6	100%	\$18.3	100%	\$3.045

N/A – none available

* Omits projects included in PWF database that lack sufficient information to determine cost

9. United States PPP Financing or Delivery of Road Projects by Project Type

There are 62 PPP road projects in the United States representing \$41.5 billion, as listed in Exhibit 19. Exhibit 20 displays the distribution of these projects by project type. As shown in Exhibit 20:

- Most of the U.S. road projects are for toll and non-toll highways, representing 44 percent and 39 percent of the total number of projects, respectively.
- In terms of project costs, the largest type of PPP road project is toll highway, representing 62 percent of total cost.
- Non-toll highway projects account for only 19 percent of total cost, since toll highway projects are often much larger than their non-toll highway counterparts.

At just over \$900 million each, toll highway projects are about three times the cost of non-toll highway projects, according to Exhibit 19.

Exhibit 21 displays the distribution of U.S. PPP road projects by contract type. As shown in Exhibit 21:

- Most of the U.S. road projects involve *DB* and *DBOM* contracts with *DB* the largest contract type at 40 percent of the projects and 34 percent of the costs. These PPP contracts include both toll highway and non-toll highway projects.
- While *DBOM* projects represent only 16 percent of the total number of PPP projects in the U.S., they amount to 37 percent of the total costs. This is because *DBOM* projects at \$1.6 billion each are about three times the size of their *DB* counterparts, with contract terms of up to 20–30 years.
- The third most frequently used contracting method is *Management Contract* at 15 percent. These are relatively small non-toll highway projects in terms of cost, which is reflected by the small percentage (1 percent) of total costs accounted for by *Management Contract* projects, whose terms are typically from 5-7 years.
- While there are fewer *Concession* and *DBFO* contracts in the U.S., their average cost is significantly higher than their *DB* counterparts, particularly *Concession* contracts at about \$1.3 billion each.

When compared to the rest of the world, the U.S. experience in PPPs shows a much greater use of *DB*, *DBOM*, and *Management Contract* approaches to deliver road projects. By contrast, particularly in Europe, Asia & Far East, and Latin America & Caribbean, there is much greater use of *Concession* and *BOT/BOT* contracting to deliver road projects. Within North America, Mexico also makes greater use of *Concession* contracts for its toll highway projects than the U.S.

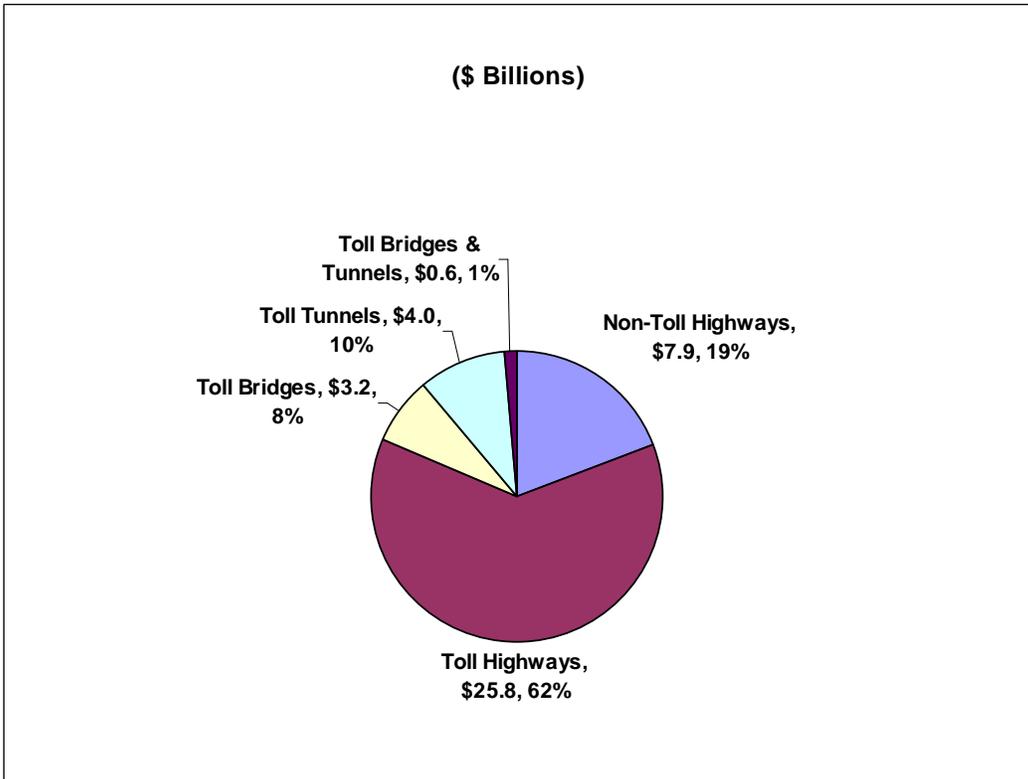
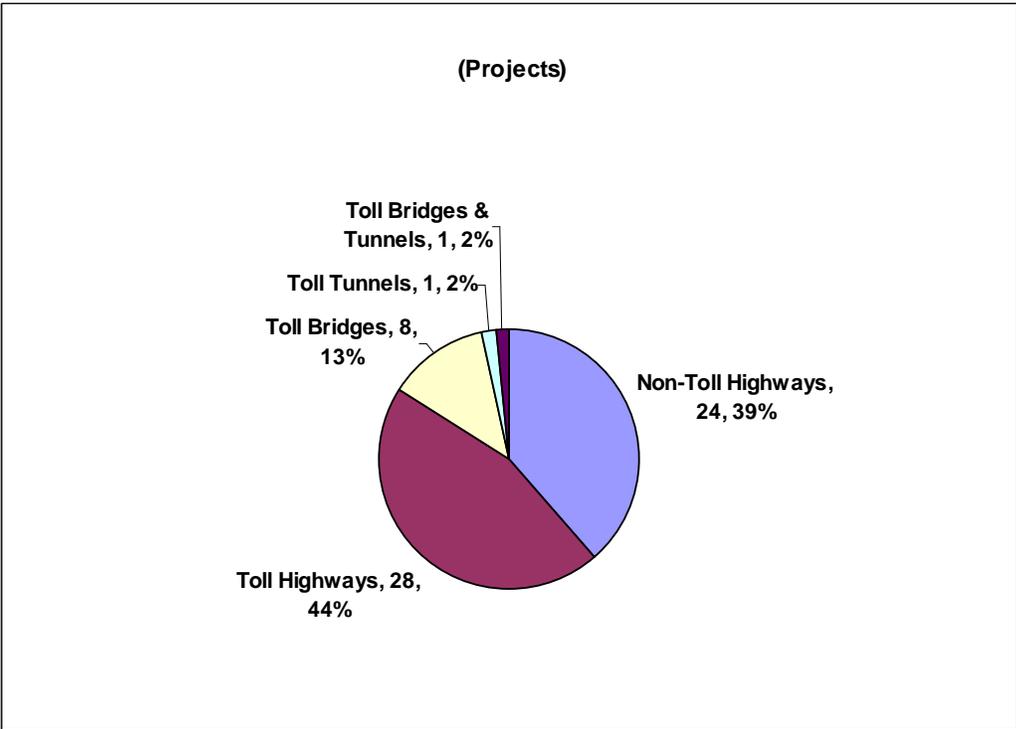
Worldwide, the United States has the vast majority of the *DB* and *Management Contract* road projects. While not extensively used in any region, *BOO* is also used more in the U.S. than elsewhere, particularly for small projects involving toll bridges. In terms of average project cost, PPP road projects in the United States are about the same size as in Europe and Asia & Far East at about \$670-690 million.

**Exhibit 19 – United States Road Projects Planned or Completed
since 1985 by Project Type and Contract Type***

Project Type	Contract Type	Number	Percent	\$ Billion	Percent	\$B/Project
Non-Toll Highways	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	4	17%	\$1.1	13%	\$0.264
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	12	50%	\$6.4	81%	\$0.533
	Mgt Contract	8	33%	\$0.5	6%	\$0.061
	Subtotal	24	100%	\$7.9	100%	\$0.331
Toll Highways	Concession	5	18%	\$5.7	22%	\$1.140
	DBFO	2	7%	\$1.5	6%	\$0.765
	DBOM	5	18%	\$10.5	41%	\$2.098
	BOT/BTO	3	11%	\$1.2	4%	\$0.386
	BOO	0	0%	\$0.0	0%	N/A
	DB	12	43%	\$6.8	26%	\$0.565
	Mgt Contract	1	4%	\$0.1	0%	N/A
	Subtotal	28	100%	\$25.8	100%	\$0.920
Toll Bridges	Concession	1	13%	\$1.8	57%	\$1.800
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	2	25%	\$0.4	13%	\$0.208
	BOO	4	50%	\$0.1	3%	\$0.021
	DB	1	13%	\$0.9	27%	\$0.860
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	8	100%	\$3.2	100%	\$0.395
Toll Tunnels	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	1	100%	\$4.0	100%	\$4.000
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	0	0%	\$0.0	0%	N/A
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	1	100%	\$4.0	100%	\$4.000
Toll Bridges & Tunnels	Concession	0	0%	\$0.0	0%	N/A
	DBFO	0	0%	\$0.0	0%	N/A
	DBOM	0	0%	\$0.0	0%	N/A
	BOT/BTO	0	0%	\$0.0	0%	N/A
	BOO	1	100%	\$0.6	100%	\$0.600
	DB	0	0%	\$0.0	0%	N/A
	Mgt Contract	0	0%	\$0.0	0%	N/A
	Subtotal	1	100%	\$0.6	100%	\$0.600
Total Road Projects in U.S.	Concession	6	10%	\$7.5	18%	\$1.250
	DBFO	2	3%	\$1.5	4%	\$0.765
	DBOM	10	16%	\$15.5	37%	\$1.555
	BOT/BTO	5	8%	\$1.6	4%	\$0.315
	BOO	5	8%	\$0.7	2%	\$0.137
	DB	25	40%	\$14.0	34%	\$0.562
	Mgt Contract	9	15%	\$0.6	1%	\$0.066
	Total	62	100%	\$41.5	100%	\$0.669

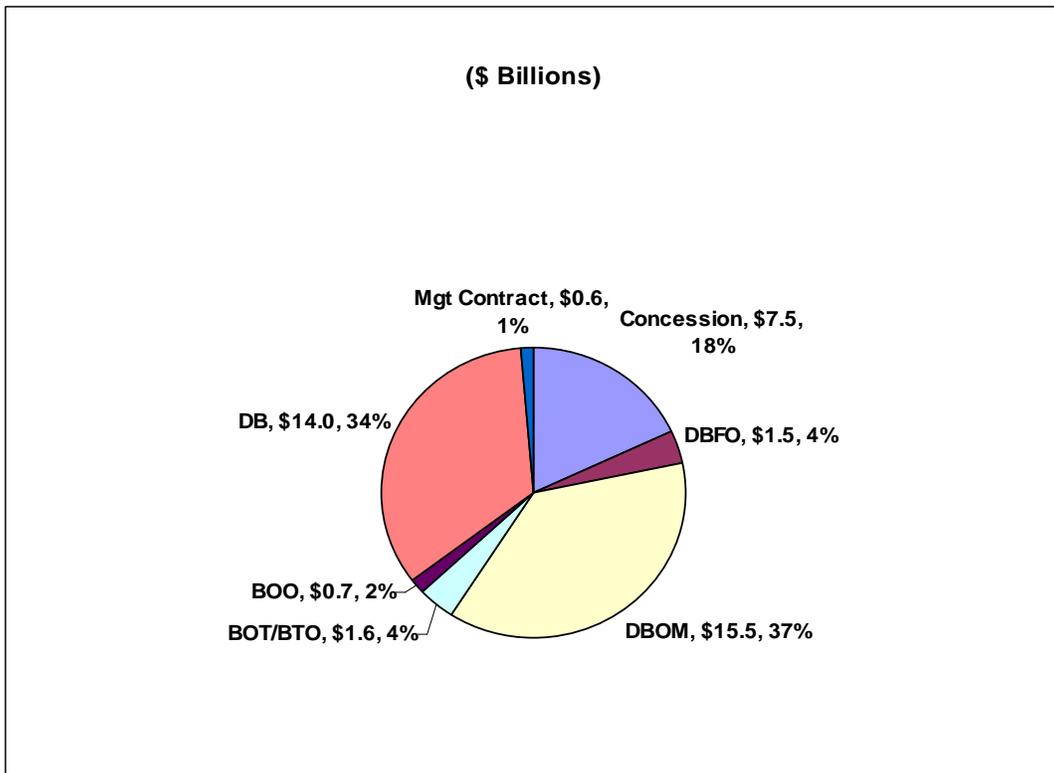
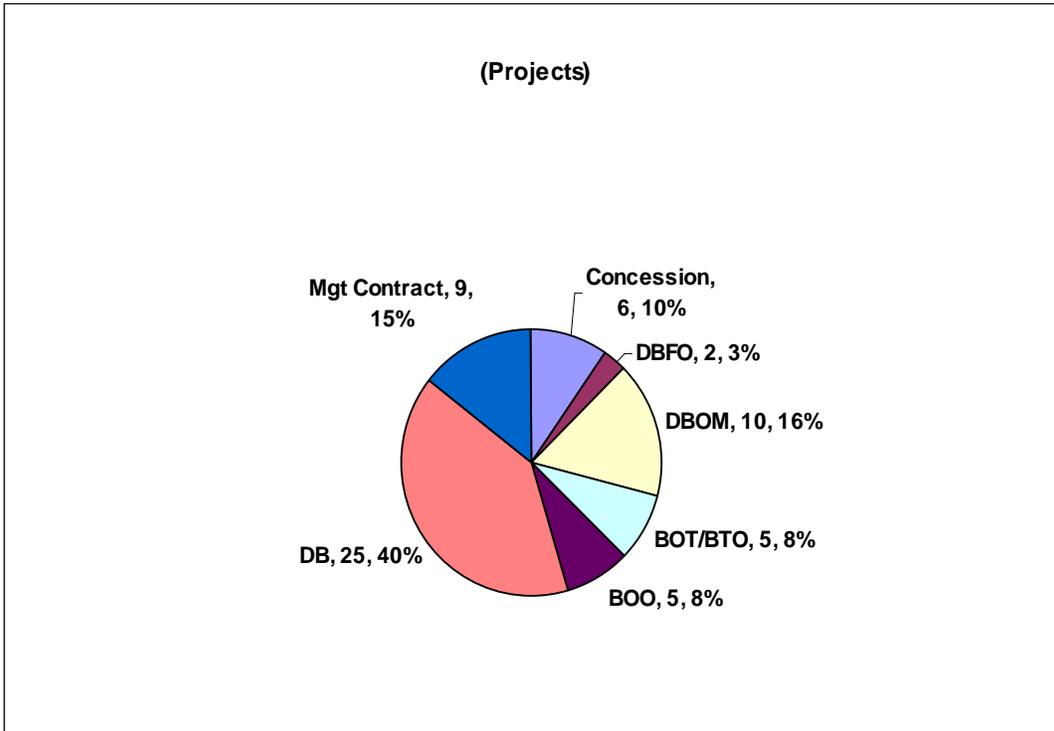
* Omits projects included in PWF database that lack sufficient information to determine cost

Exhibit 20 – United States Road Projects Planned or Completed since 1985 by Project Type*



* Omits projects included in PWF database that lack sufficient information to determine cost

Exhibit 21 –United States Road Projects Planned or Completed since 1985 by Contract Type*



* Omits projects included in PWF database that lack sufficient information to determine cost

10. Conclusions

This synthesis of PPP projects from around the world demonstrates the wide variety of infrastructure, project, and contract types using PPP arrangements to finance or deliver critical public-use infrastructure. PPP projects represent almost a trillion dollar investment in planned or completed infrastructure projects worldwide since 1985. The largest component of this is for highway-related projects, which on a global basis represents almost 40 percent of the total costs of PPP projects planned or completed over the past 20 years. In the United States alone, PPP projects represent a \$104 billion investment in infrastructure since 1985, of which \$42 billion is for roads, bridges, and tunnels. This represents 13 percent of the total PPP funding for highway-related projects worldwide.

While the use of private sector resources to leverage scarce public sector resources for road projects is not new, what is new is the growing interest in and variety of funding, financing, and project delivery approaches that are emerging under the guise of public-private partnerships. This transformation has been spurred by fundamental changes in how nations overseas perceive the relative roles, responsibilities, risks, and rewards of the public and private sectors for infrastructure ownership, funding, development, and operation. This is best illustrated by the trend towards privatizing the road development and management programs of nations in Europe, Asia, and Latin America since the early 1990s. This was spawned by two key developments: (1) the recognition that the public sector could not afford on its own to adequately support the growing needs for highway-related infrastructure in many nations; and (2) the changing institutional context resulting from the emergence of Eastern European nations following the break-up of the Soviet Union. Even in the United States, where a substantial dedicated funding mechanism long supported a robust highway development program, there is growing recognition that traditional infrastructure funding and delivery approaches are inadequate to meet the increasing economic development and mobility needs of citizens and businesses alike, while keeping the existing highway system in a state of good repair.

When other regions of the world began to experiment with different ways to finance and deliver highway infrastructure through greater involvement by the private sector, such as the early use of *Shadow Tolls* in the U.K. and Portugal, *Concessions* in Spain and Germany, *Joint Development Agreements* in China, and *Asset Sales* in Mexico, the United States was less aggressive in applying PPPs to its highway program. Most PPP road projects in the U.S. have been delivered through *Design-Build* or *Management Contract* approaches. As noted above, this was due to the existence of a dedicated funding program and a strong tradition of separating the public and private sector stakeholders in the delivery and financing of highway facilities. As developed nations in Europe, Asia, and South America moved to the *Concession* or *BOT/BTO* approaches to PPPs, they granted contracting teams more responsibility and flexibility to produce desired performance outcomes while promoting higher levels of accountability and transparency. These are important lessons for public sponsors and private developers of highway infrastructure in the United States who are interested in applying PPPs to expedite the delivery of needed facilities and services.

Clearly there are ample resources and techniques available to help spur PPP infrastructure initiatives in the United States, provided the public and private stakeholders in the process are willing and able to enter into prudent business relationships that are based on mutual trust, flexibility within a defined contractual framework, transparency and accountability, and the ability to achieve a reasonable balance of risks and rewards between all parties to the partnership. With over \$42 billion already identified for PPP road projects in this country and even greater flexibility to promote PPPs under the recently-enacted SAFETEA-LU³ reauthorization of the Federal-Aid Highway Program, the prospects are bright for the United States to make even greater use of PPPs for highway infrastructure financing and development in the future. One way to expedite this transition is to learn from international experts in the development and administration of PPPs, where their experiences can be related to the situations, constraints, and opportunities found in this country.

This synthesis is one way to benefit from this experience by revealing the nature and extent of PPP arrangements being proposed and implemented around the world. The results are intended to inform decision-makers and potential practitioners of the many choices available to public and private parties to a PPP for structuring and managing the partnership for the maximum benefit of the traveling public and the investment community willing to place its capital at risk to expedite these projects.

³ On July 29, 2005 Congress passed the “Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users” or “SAFETEA-LU”. The Act authorizes \$286.5 billion in funding for surface transportation projects through FY 2009. It also includes several provisions that will enable public funds to be leveraged with private investment through public-private partnerships, including:

- \$15 billion in *private activity bonds (PABs)* for highways and surface freight transfer facilities,
- enhanced authority to use *tolling* to finance construction of interstate highways,
- increased flexibility in using *Design-Build contracting*,
- *streamlined environmental processes*, including a 180-day statute of limitations on actions contesting federal agency approvals for transportation projects, and
- improvements to innovative finance programs, including *Transportation Infrastructure Finance and Innovation Act (TIFIA)* and *State Infrastructure Banks (SIBs)*.